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NASA TECH BRIEF

Cuprous Selenide and Sulfide Form Improved Photovoltaic Barriers

The problem:

To form chemically and electrically stable photovoltaic barriers on N-type gallium arsenide. Cuprous iodide, which has been used to form photovoltaic barriers, increases in electrical resistance when heated.

The solution:

The photovoltaic barriers are formed by depositing a layer of polycrystalline cuprous sulfide or cuprous selenide on the gallium arsenide. The chemical and electrical stability of these barrier materials is considerably greater than that of cuprous iodide.

How it's done:

The cuprous sulfide and cuprous selenide layers may be deposited on the gallium arsenide by one of the following methods: (1) electroplating elementary copper, followed by its conversion to the sulfide or selenide; (2) vacuum deposition of the copper, followed by its conversion to the sulfide or selenide; or (3) vacuum deposition of the sulfide or selenide (followed in the case of cuprous sulfide by a chemical treatment).

Notes:

1. In solar cell applications, cuprous selenide is superior to cuprous sulfide because it permits a better compromise between optical transmission and electrical sheet resistance.
2. A solar cell with a 3.7% conversion efficiency was fabricated by depositing a cuprous selenide film on a polycrystalline gallium arsenide film. The cuprous selenide barrier, without an antireflection coating, had a 75% transmission at 1 to 5 electron volts.
3. Inquiries concerning this innovation may be directed to:

   Technology Utilization Officer
   Western Operations Office
   150 Pico Boulevard
   Santa Monica, California, 90406
   Reference: B66-10025

Patent status:

No patent action is contemplated by NASA.

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Categories 01, 03